



121.03 Accelerator Systems Overview

SC1 Accelerator Systems

Paul Derwent

PIP-II IPR

4-6 December 2018

In partnership with:

India/DAE

Italy/INFN

UK/STFC

France/CEA/Irfu, CNRS/IN2P3

Outline

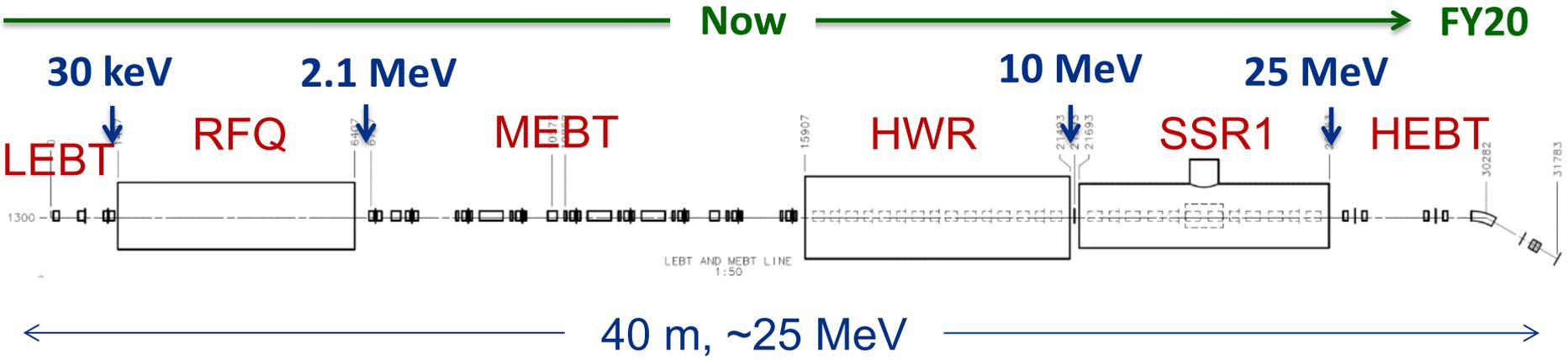
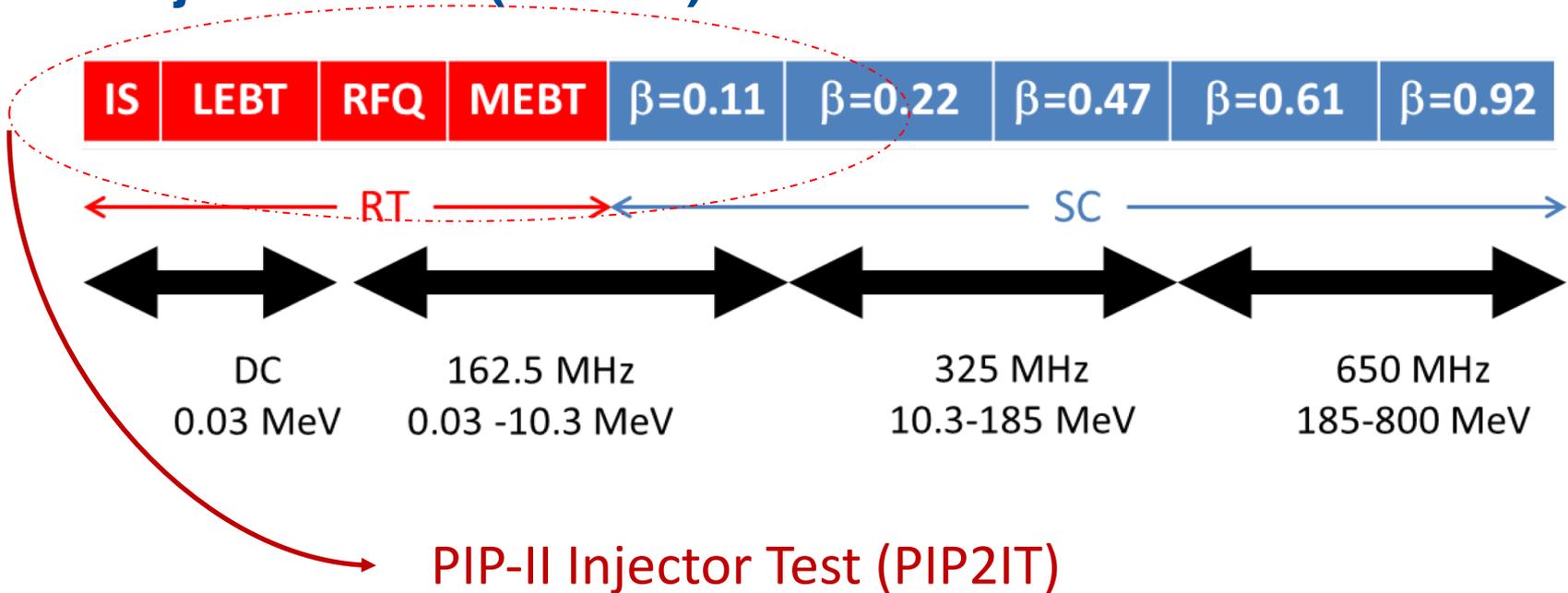
- 121.03 L2 Scope
- PIP2IT
 - Development area for many systems – all L3 areas are working here
 - Mission and goals
- Organizational Changes since CD-1
- Vacuum and Safety Systems

- Labor, materials, travel, and other costs associated with the management, design, procurement, fabrication, and testing of various accelerator system hardware and software including High Power RF, RF distribution, Low Level RF, Magnets, Power Supplies, Vacuum, Controls, Safety Systems, and Instrumentation. Also includes Accelerator Physics.

All the systems needed to make it work!

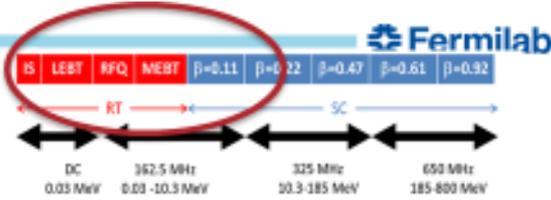
WBS Dictionary : pip2-docdb #599

PIP-II Injector Test (PIP2IT)



Slide from P. Derwent presented at CD-1

PIP-II Injector Test: PIP2IT



- Mission Statement:

The PIP-II Injector Test (PIP2IT) facility replicates the front end of the PIP-II linac through the first SSR1 cryomodule. **PIP2IT is intended to serve as a complete systems test that will reduce technical risks associated with the PIP-II linac in both pulsed and CW operating modes.** It is anticipated that PIP2IT will be operated for several years beyond the initiation of PIP-II construction, with the eventual relocation of major PIP2IT components and systems into the PIP-II linac enclosure, where they will serve as part of the PIP-II front end. The construction and operating period of PIP2IT splits naturally into two phases.

- Phase 1

- retirement of risks associated with operation of the PIP-II linac in pulsed mode as required for neutrino operations and described in the CDR (1% duty factor).

- Phase 2 (not part of project)

- retirement of risks associated with CW operations, in particular as related to utilization of the PIP-II linac for a second generation Mu2e experiment
- important for future scientific opportunities with PIP-II linac
- additional hardware : a high power beam dump



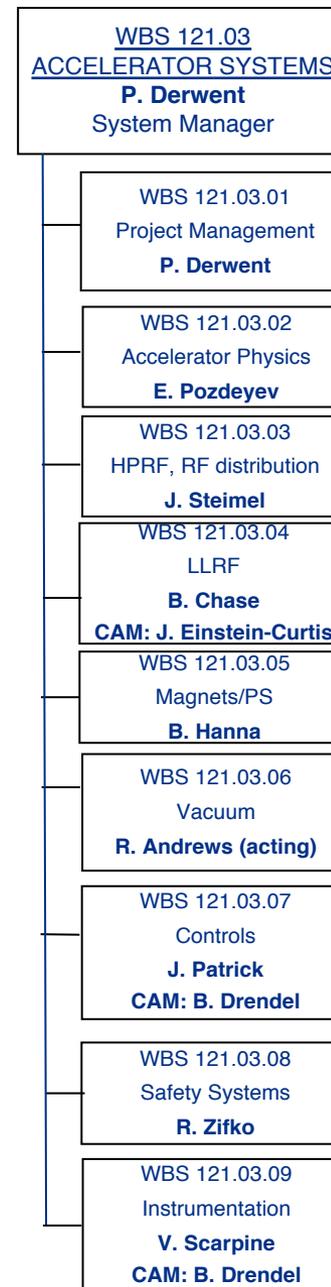
Organization changes since CD1

- Rearranged the L2 since CD1
 - Split the “Linac” into multiple pieces
 - SRF & Cryo
 - **Accelerator Systems**
 - Consolidation and Rearrangement
 - Warm Units and Vacuum WBS
 - 1 Magnet WBS
 - BTL / BAL moved to Accelerator Complex
 - Installation and Commissioning

121.2 Project Management S. Holmes	121.3 Superconducting Linac F. Garcia	121.4 Rings Upgrades I. Kourbanis	121.5 Conventional Facilities S. Dixon
121.2.2 Fermilab & USA Coord S. Holmes	121.3.1 Project Management F. Garcia	121.4.1 Booster B. Pellico	121.5.1 Project Management S. Dixon
121.2.3 International Coord S. Holmes	121.3.2 Accelerator Physics V. Lebedev	121.4.2 Recycler/Main Injector J. Dey	121.5.2 Site Preparation (S. Dixon)
121.2.4 Business Office L. Lari	121.3.3 Warm Front End L. Prost		121.5.3 Cryo Plant Building (S. Dixon)
121.2.5 ESH/QA T. Dykhuys	121.3.4 HWR Z. Conway		121.5.4 Utility Plant Building (S. Dixon)
121.2.6 System Eng & Integ A. Rowe	121.3.5 SSR1 D. Passarelli	121.3.14 Beam Transfer Line (S. Mishra)	121.5.5 High Bay Building (S. Dixon)
121.2.7 Conv Facil Coord S. Dixon	121.3.6 SSR2 D. Passarelli	121.3.15 Beam Absorber (S. Mishra)	121.5.6 Linac Tunnel (S. Dixon)
	121.3.7 LB650 (A. Rowe)	121.3.16 Beam Instrumentation V. Šcarpine	121.5.7 Linac Gallery (S. Dixon)
	121.3.8 HB650 (A. Rowe)	121.3.17 Control System J. Patrick	121.5.8 Beam Trans & Absorb Line (S. Dixon)
	121.3.9 RF Power D. Peterson	121.3.18 Vacuum A. Chen	121.5.9 Booster Connect (S. Dixon)
	121.3.10 RF Integration B. Chase	121.3.19 Gen Supp. Services C. Baffes	
	121.3.11 Cryogenic Systems A. Klebaner	121.3.20 Safety Systems J. Anderson	
	121.3.12 Warm Units A. Chen	121.3.21 Test Infrastructure J. Leibfritz	
	121.3.13 Magnet Power Supplies B. Hanna	121.3.22 Install, Integ & Commiss C. Baffes	

WBS 121.03 Accelerator Systems

- Experienced team with both operational and project expertise, both on the technical and management side
 - NOvA
 - LCLS-II
 - LBNF
 - Mu2e
 - g-2
 - FRIB



Presentations

Breakout Presentations

SC1 Accelerator Systems

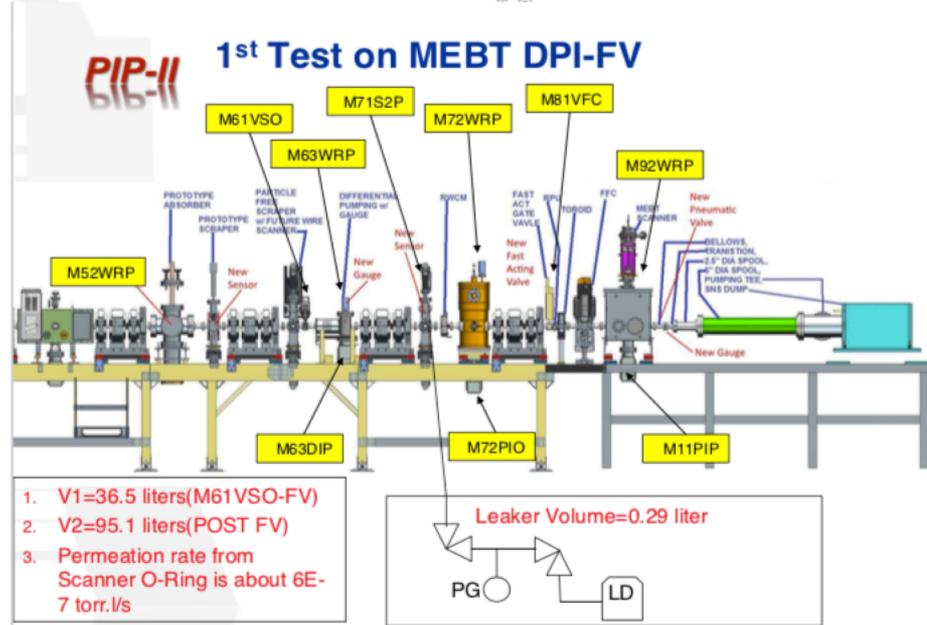
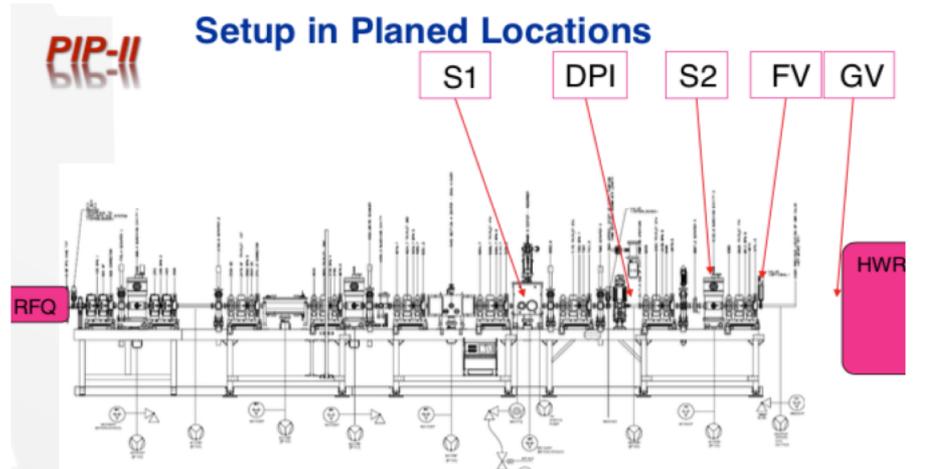
121.03.02	Linac Beam Dynamics	A Saini
121.03.03	High Power RF and RF Distribution	J Steimel
121.03.04	Low Level RF	B Chase
121.03.05	Magnets and Power Supplies	B Hanna
121.03.07	Controls	J Patrick
121.03.09	Instrumentation	V Scarpine

121.03.06 Vacuum & 121.03.08 Safety Systems

- Vacuum
 - Focus on PIP2IT
 - Diagnosing RFQ vacuum leaks
 - Understood, solution proposed & tested, implementation underway
 - Warm to cold vacuum transition tests
 - System works as designed
 - Preliminary Design work just getting underway
 - Transfer Lines well understood
 - SRF have good working examples at CMTS and FAST
- Safety Systems
 - Mature technology at Fermilab
 - Enclosures, interlocks, critical devices
 - Baseline well understood
 - Further development awaits detailed building and tunnel design

Progress to date: Vacuum interface warm to cold

- Transition from warm MEBT to cold HWR
 - Protect against vacuum accidents contaminating SRF
- Testing at PIP2IT
 - Controlled leaks
 - Observe response
- System works as designed



5

A Chen | Tuesday Technical Meeting

Fermilab

Fermilab
PIP-II
Proton Improvement Plan-II